

## **Participatory Analysis of the Potato Knowledge and Information System in Ethiopia, Kenya and Uganda**

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## **Participatory Evaluation of Imperfections in Interaction Between Potato Stakeholders in Ethiopia, Kenya and Uganda**

### **ABSTRACT**

The knowledge and information system of the potato sector in Kenya, Uganda and Ethiopia was analyzed through participatory stakeholder meetings. The matrix of interactions between components of the knowledge and information system was constructed resulting. The matrix of opinions of stakeholders about each resulted in the identification of innovation system bottlenecks. This formed the basis for the identification of possible solutions. Coverage by development partners need to be improved through creative collaboration between research, extension and mass media. Specific communication expertise has to be develop in research organizations. More research is required into how to improve farmer to farmer flow of information. More durable platforms for information exchange and collaboration towards technological, methodological and organizational innovation are required in all three countries. Further process facilitation is required to create these platforms for information exchange. National research organization may be the most appropriate champions of such information exchange platforms, as they are relatively impartial in the potato chain, can draw on expertise from social, organizational and technical science and have a durable presence assuring some durability of the effort.

**Keywords: stakeholder interaction, potato production and marketing, knowledge system**

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## **INTRODUCTION**

Potato is an important crop for smallholders in Kenya, Uganda and Ethiopia, serving as both cash and food security crop. Potato production has tripled in ten years in Sub Saharan Africa (SSA), almost exclusively due to area expansion (Faostat 2006). Because of the restriction of the potato crop to the highlands, combined with its ever growing consumption in cities, it is the cash crop of the future for the densely populated East and Central African highlands. To satisfy a growing demand from urban centers for cheap food there is room for additional growth of potato production. Further area expansion puts a strain on natural highland forests in Eastern Africa. Producing potatoes at lower altitudes in the equatorial tropics is not feasible due to pest and disease pressure and physiological limitations of the potato crop. The only option for increased potato production is an increase in productivity.

In Kenya potato is the second most important food crop after maize (Faostat 2006), while in Ethiopia potato production can fill a gap in food supply during the 'hungry months' before the grain crops are being harvested. In South Western Uganda potato production is key to supporting the income and food security of the rural population. Average potato yields for 2005 in Kenya, Uganda and Ethiopia are estimated at 7.7, 6.9 and 10.5 tonnes/ha respectively (Faostat 2006), while progressive farmers can attain yields of 25 tonnes/ha.

This yield gap can be explained by poor management of late blight, bacterial wilt and viruses, low soil fertility and drought stress. Interventions to improve crop husbandry by poor potato farmers by increasing their knowledge may have considerable impact on their livelihoods, both in terms of improved food security as well as through income generation.

For promoting successful technological and methodological innovations, it is important to understand the current agricultural knowledge and information systems related to the potato crop (AKIS-potato). An AKIS is a group of individuals, public organizations (governmental and non-governmental) and the private sector that exchange information and knowledge related to potato management, processing and trade (Engel 1997). Understanding this system, the components and the way in which they interact is the essential first step for a more efficient innovation system (Lundvall *et al.* 2002; Hall *et al.* 2004).

This understanding of the AKIS potato will allow research and development organizations to coordinate interventions in a way that makes use of the comparative advantages of each stakeholder. As part of a larger project on farmer participatory research the knowledge and information system of the potato sector in Ethiopia, Kenya and Uganda and the interactions between stakeholders in the sector were analyzed. The objectives of the study were: 1) identify bottlenecks in interaction between the different stakeholders. 2) identify priorities for intervention in the potato sector. 3) draw conclusions on how to improve the flow of information in the system.

## **METHODOLOGY**

Multi-stakeholder workshops were organized to identify constraints and opportunities in the potato sector, with specific focus on improving the potato related agricultural knowledge system in Kenya, Uganda and Ethiopia. In Ethiopia the meeting consisted of a single event of

2 days with representatives of potato-related organizations and farmers from Alemaya, Galessa, Jeldu and Degem districts. In Uganda a single day workshop with representatives from Kabale district was organized. In Kenya two single day stakeholder workshops were conducted in both Bomet and Nyandarua districts.

Workshop participants were grouped together according to stakeholder category, for example ware potato farmers, seed potato farmers, public extension, NGO representatives, processors, transporters or agro-input suppliers. Stakeholder categories present in the meeting varied per country as a result of different responses to invitations to attend. All groups analyzed their own role and the role of other stakeholders in the potato chain and a matrix of all interactions was constructed, following a method described by Biggs and Matsuert (2004). First every stakeholder group identified its interactions with other stakeholders in the potato chain. Consecutively the constraints in these interactions were identified. The full matrix of interactions was constructed by the workshop facilitators and the opinions of the different stakeholders about each other were presented back to the plenary group, and were discussed.

In Kenya in the second workshop in both Bomet and Nyandarua the problems identified in the first workshop were prioritized. Every participant ranked the five most important constraints, with every constraint receiving 5, 4, 3, 2 or 1 point according to importance. Consecutively solutions to the most important constraints were discussed in groups mixing different stakeholders, and reported back to the plenary for further elaboration.

## **RESULTS AND DISCUSSION**

### ***Kenya***

The main components of the AKIS-potato in Kenya were the national research organization KARI, the public extension service of the ministry of Agriculture, agro-input dealers, the Kenya Potato Growers and Marketing Organization (KPG&MA), local government, potato transporters, traders, brokers and middlemen, seed potato farmers and consumption potato producers. Remarkably absent in the AKIS-potato in Kenya are NGOs.

Almost all stakeholders in Bomet complained about the so called 'extended bag', which is a woven jute bag extended by weaving a net, or another bag on top resulting in very large packing units of 150-200 kg. This results in low prices according to farmers and extension workers. Even the trader present acknowledged the extended bags were not ideal, but forced upon them by market brokers in Nairobi. The Kenya Potato Growers & Marketing Association (KPG&MA) and the Kenyan government are making efforts standardize the bag used for ware potatoes at 110 kg. The participants in both Nyandarua and Bomet agreed that ideally a price per kilo would be paid, but that this required a level of organization to get communal weighing balances.

The potato marketing chain in Kenya is imperfect and long (Figure 1) and all stakeholders present at the workshop complained about exploitation by brokers, of which representatives were invited, but failed to be present at the meeting. It is however acknowledged by the producers that field brokers fulfill a role in the marketing chain and that the field level brokers were members of their community and needed to make a living as well. It is felt that their commission should be fixed and not depend on their speculation skills through which they exploit both farmers and traders.

Between many different stakeholders there are middlemen and brokers, who form a barrier for the flow of information on both product quality as well as market prices. There is no direct contact between farmers and the final market outlet. Low quality farm gate produce as a result of a lack of grading on tuber size and quality, immature harvesting and mixing of varieties leads to high losses in the transport, marketing and processing chain. There is however no feedback mechanism from the market to the farmer about the quality of the produce and there is no real visible price incentive on the side of the farmers for delivering higher quality potatoes.

As a result of the involvement of many different interim handlers the transaction costs between producer and consumer are relatively high (Kirumba *et al.* 2004). Prices at farm gate fluctuate widely and no price information is exchanged between farmers resulting in limited farmer bargaining power. It has been found that, in the case of Peru, farmers' access to price information enhances their power bargain and farmers can have a significant increase in the price they get from traders (Vakis 2002). Brokers at field level offer bottom prices during periods of glut, and it is take it or leave it from the side of the producers as they can not store potatoes at the farm. These low prices do not translate into much lower prices for consumers. At the level of the market brokers, who mediate between transporters and whole sale, there seem to be unneeded transaction costs.

Farmers in Nyandarua feel that the bad road system is to blame for low farm gate prices. Nyandarua is however also known as the source of the lowest quality potatoes. In Bomet less complaints are heard about the roads, which is related to the importance of tea production in the Bomet highlands. The Kenya Tea Development Association (KTDA) actively maintains rural feeder roads to keep the tea deliveries by smallholders secured. In Nyandarua roads are exclusively maintained by the local government.

An important problem identified in both districts is the non-availability of quality seed potatoes. The need for certification is stressed as farmers, extension workers and the KPG&MA claim that farmers are cheated with bad quality potatoes sold as seed. The seed growers state that farmers are not prepared to pay the extra price for good quality seed.

The lack of information transfer, and especially the limited contacts between research, extension and farmers, is raised as a concern, especially in Nyandarua. Research is responding slowly to problems raised by the extension staff. Extension staff is blamed for not delivering new technology, reacting slow to farmers, not being visible and not leaving their offices. In the opinion of farmers (potato growers, seed farmers and the KPG&MA) the role of research and extension also involves the supply of high quality basic seed. Also the lack of credit facilities is mentioned as a defect of the extension service. As such farmers do not see the 'change agents' in research and development as messengers of information only, but look towards these service providers with wider expectations. The sometimes impossible limbo of extension workers becomes painfully clear in this exercise. They are the 'middle management' of the agriculture knowledge system, who are easily blamed for imperfect communication. Under resource poor conditions they have to live up to high expectation from the side of the farmers. Also from the side of research they are expected to communicate 'new information' to the farmers, that are not necessarily receptive to or interested in this information. The KPG&MA recognizes the fact that public extension workers cannot always reach the farmers due to their limited numbers.

Figure 2 illustrates the opinions of agro-input dealers, farmers and extension workers about each other. Extension workers note the low attendance of agro-input dealers in training efforts as a constraint, while the agro-input dealers identify the bad timing of meetings by extension staff as a problem. Potato producers note a lack of knowledge on new technologies on the side of extension staff, while the extension workers accuse farmers of being resistant to new technology. The input dealers feel that they can play a role in information transfer and advise regarding the use of agro-chemicals. The extension service however does not recognize them as technicians who could play a role in extension and accuse them of misinforming farmers. On the other hand the dealers do give advise to farmers, but complain that farmers do not follow the advises regarding the use of chemicals. Farmers complain that the dealers sell them doctored products and even that they create deliberate shortages to later hike the prices of products in high demand. When looking at Figure 2 there seem to be opportunities to improve information flow through improving the linkage between extension and agro-input dealers, who already have strong contacts with farmers. In the way stands however mistrust towards the dealers. Moreover, the dealers indicate that farmer are not willing to learn, an opinion they share with the extension workers.

In the second workshop problems were prioritized (Table 1). It is clear that there is no single type of solution for potato-related problems and that a multi-stakeholder approach is needed promote different types of innovations. The suggested solutions would involve service (training) innovations in several cases, but in others, innovations in the way stakeholders relate to each other (types of contracts and ways to build trust), and in the way they exchange information or access technologies and trade to each other. It is also clear the need for organizational innovations basically on the side of farmers.

The lack of high quality seed was ranked high in both Bomet and Nyandarua. The limited use of fertilizers and chemicals was identified as problematic in both districts. The minimal contacts between research-extension and farmers featured higher in Nyandarua than in Bomet. In both districts minimal exchange of price information, especially between farmers, was mentioned as a problem.

The ranking of the priorities gave the onset for the discussion on intervention points. In multidisciplinary groups possible interventions to solve the four top most important constraints were discussed (Table 1).

When analyzing the suggestions for improvement, the need for farmer organization becomes clear. For almost any intervention a level of farmer organization is required. The KPG&MA looked the obvious forum that could support further intervention. The farmers however indicated a general reluctance to join such initiatives as a result of a long history of failed organizations and dishonest leadership. Participants indicated the necessity to keep community leaders with a previous history in failed communal projects out of the creation of any new initiative to reduce the level of mistrust among potential members. The set-up of study groups and common interest groups was floated as a possible option to improve farmer-extension-research linkages, test new technologies, receive training and multiply seed.

Interestingly the different actors were very aware of the need for quality improvement at the farm gate level. Size grading, purity of variety and the proper hardening of the skin of the tubers are possible improvements. Higher quality seed is required as a part of quality improvement. To improve the bargaining power of small-scale farmers on-farm storage or communal storage was suggested. Contract farming by a crisp processor was also indicated as

an option to assure higher and stable farm gate prices. This will be further developed in collaboration between the national research program, extension service, a crisp processor and farmers.

For improvement of the ware potato market chain resistance against change can be expected from the side of brokers, transporters and traders, especially at the level of market and field brokers and involvement of the local administration may be needed to enforce change in certain circumstances.

### *Ethiopia*

In the stakeholder workshop in Ethiopia 14 AKIS-potato components were identified: Researchers, farmers, potato traders, consumers, the district bureau of agriculture, transporters, casual laborers, NGOs, farmer cooperatives, brokers, store owners, media, agro-input suppliers and supermarkets. The marketing was identified as the activity with most interaction between stakeholders. The main providers of information to farmers were identified as the research and extension, as well as the suppliers of agricultural inputs.

The analysis of constraints in interaction showed that researchers were particularly disappointed in the uptake of technologies by farmers, in spite of much increased efforts to make farmers participate in technology development. Also the flow of information from trained farmers to others in the community is said to be limited. Collaboration by researchers with the public extension workers from the district bureau of agriculture is difficult as they are too few and have not enough time to collaborate.

Farmers indicate the low quality of agricultural inputs as a constraint. They further identify low potato prices and dishonest brokers as problematic. In the interaction with extension staff they notice a level of own interest in the activities employed.

The traders indicate low quality produce at farm gate level as their main problem and identify this as the reason for the low prices offered to farmers. Furthermore they see the absence of large buyers as a constraint. They market the product in small quantities, and it takes long to sell all produce and the risks of spoilage are high.

The public extension service indicates they lack good interaction with the researchers. Research outputs do not reach the end-users in a timely manner as a result of this. Farmers are said to ignore their advice, in spite of training, and not to adopt newly introduced technology. Input suppliers are said to supply low quality products to farmers at inflated prices. The extension service acknowledges a limited interaction with NGOs. NGOs indicate a slow response from the side of research to requests from practice. Also farmer participation in different development activities is below expectation.

Similarly to Kenya, different types of innovations are needed to improve the AKIS or potato innovation system in Ethiopia. Table 2 sums up the most important constraints identified and the solutions proposed. In general it was realized from the discussion with the stakeholders that the linkages between many of the stakeholders in the potato production and marketing system are weak. This has as an implication that the flow of information and development of knowledge in the system is hampered.

There is specific need to find creative ways of improving the interaction between farmers, agricultural extension providers and researchers. Organizational innovation on the part of

farmers is identified as crucial if the system is expected to enhance as a whole. The strengthening of farmer organizations was widely recognized as imperative for improving linkages with the farmers for technology dissemination, as well as improving input supply and output marketing. The lack of a platform for exchange between all stakeholders in the potato knowledge system was noted. Such a platform could be an instrument to improve linkages between stakeholders and could help in improving the flow of information through the system. This would assist in increasing production and improving the marketing chain of potatoes in Ethiopia. The lack of quality seed potatoes featured prominently in the discussion. As a solution the training of specialized seed producers and their promotion was suggested.

### ***Uganda***

In Uganda the interactions between stakeholders in the potato knowledge and information system were mapped out (Figure 3).

The different knowledge system interactions in the potato chain were ranked according to their importance in managing information. The mass media were considered to play the smallest role, while the farmers and the national research and extension institutions were ranked highest.

The type of innovations needed to improve the potato sector in Uganda (Table 3) are similar to those needed in the case of Kenya and Ethiopia. The highest priority is given to improved interaction between stakeholders in the potato chain and mechanisms for better coordination of interventions.

A major problem identified in the Ugandan potato knowledge and information system was the inappropriate packaging of information. Especially the language of materials was identified to be problematic. Moreover materials are mostly inappropriate for illiterate people. A limited flow of information was noticed between wealthy and poor sectors of the community.

Poor linkages between different stakeholders in the potato sector are identified. Especially the mass media (radio) are poorly connected to the information suppliers. Input dealers are not considered as information suppliers by extension and research, while they are considered an important source of information by the farmers. NGOs and extension do appreciate the research organizations for their participatory research activities, but consider their reach limited. Also the reach of the NGOs is considered limited. The privatized extension (NAADS) has a wider reach, but has limitations in terms of agricultural extension skills.

Interestingly farmers are said to provide limited feedback to development organizations. The development organizations also complain that farmer group continuity is unsatisfactory, and farmers show little initiative in seeking for information. More attention need to be given to farmer group formation and cohesiveness.

Suggestions for improving the flow of information are capacity building for research and extension in the development of appropriate training materials. Also improving collaboration between research, NGOs and private service providers is an opportunity to optimize the use the higher skills available in NGOs and research organizations with the larger reach of the NAADS program and the public extension service.

## **CONCLUSIONS**

The participatory workshops proved very effective in identification of knowledge and information system bottlenecks and options for intervention. It was a rare opportunity for the different components of the potato innovation system to discuss. This was a key output in itself. The matrix of interactions was an appropriate tool to identify constraints in the potato innovation system. The construction of the matrix led to a better insight of the different partners in each others perceptions, and improved mutual understanding. As such it can be the onset of improved collaboration between stakeholders in the production and marketing chain. The workshops alone are however not enough to spark action and induce positive change in the innovation system through improved collaboration. Further follow up and facilitation would be required for this.

Although the activity set out to map imperfections in information flow, the workshops ended up in identifying innovation system constraints in the potato system in a wider sense, especially in Kenya and Ethiopia. The concept of particularly focusing on knowledge flow is not easily accepted and understood by the different stakeholders, as it is just one single factor in the innovation system, and it can not be separated from other interactions. In a conceptual sense this is possible for a researcher, but in practice the distinction of the information and knowledge system from the wider potato production and marketing system is artificial and thus not practically useful in a multi-stakeholder setting. Especially in the case of the involvement of relatively large numbers of farmers in the process the direction of discussions will be towards solving the practical problems in the chain, rather than keeping a focus on information exchange.

The limited extension presence (both governmental and non-governmental) is a major impediment for the effective flow of information and clear strategies need to be developed by the different stakeholders to mediate this and improve the coverage. To improve the reach of research, non-governmental organizations and public extension several options need to be considered. In the first place agro-chemical dealers need to be considered as agents for delivering information to farmers. They have intensive contacts with farmers and could be serving as hubs for the provision of written and oral information on improved technologies to farmers. Secondly research organizations have to engage more in the development of mass dissemination strategies for their information and develop communication materials in collaboration with extension partners. For this specific expertise is required on the side of the research organizations. The mass media, especially radio, is underutilized in all three countries. It may not necessarily be the best tool to improve knowledge and induce change in farming practices, but it can arouse interest of farmers and change agents in new technology.

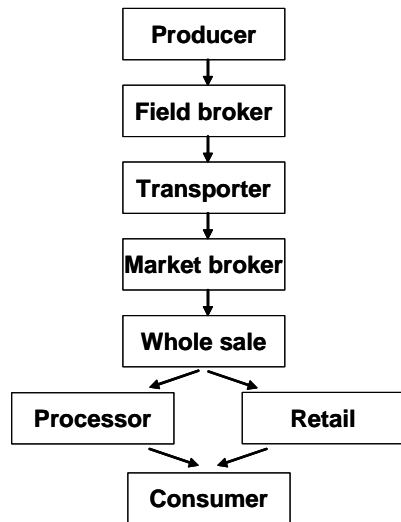
More research is required into how to improve farmer to farmer flow of information. Although farmer to farmer exchange is an important channel of information exchange, the often assumed flow of information on innovation from trained farmers to the rest of the community is not as automatic as sometimes assumed. Formal farmer facilitators or farmer organizations can be used as information transmission agents as an alternative for formal extension workers.

The meetings showed a clear need for the building of a more durable platform for information exchange and collaboration towards technological, methodological and organizational innovation in the potato sector in all three countries. The question is who should champion this platform building? National research institutes may be the best positioned to initiate this platform building, in spite of the fact that research organization have in the past shown reluctant to shift from the old linear mode of research and extension to innovation system

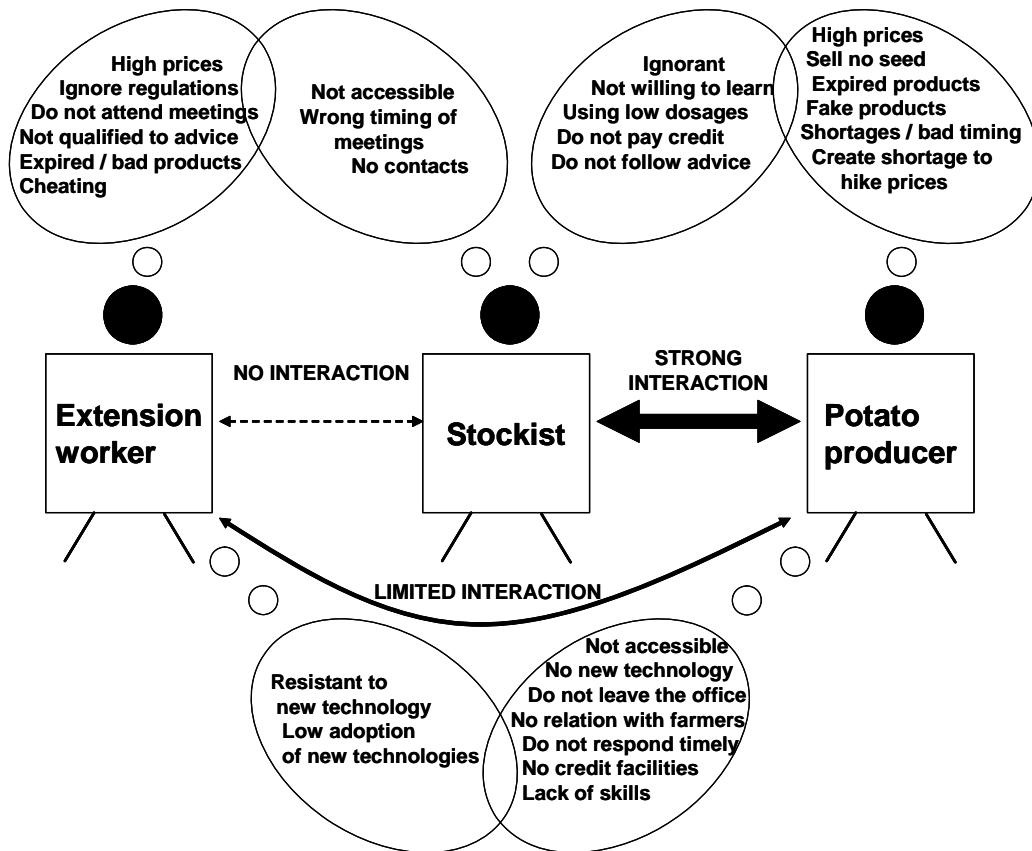
thinking. This shift will be facilitated through the intimate involvement in the platform building. Compared to the national extension services research organizations are better able to draw in expertise from different specialties that are available within their organizations, bridging between social, organizational and technical science. The national research organization will also provide a longer term sustainability than NGOs, who are mostly temporarily present and are more susceptible to donor priority shifts. Furthermore research would form a more impartial stakeholder than extension staff who are more directly involved with all other stakeholders.

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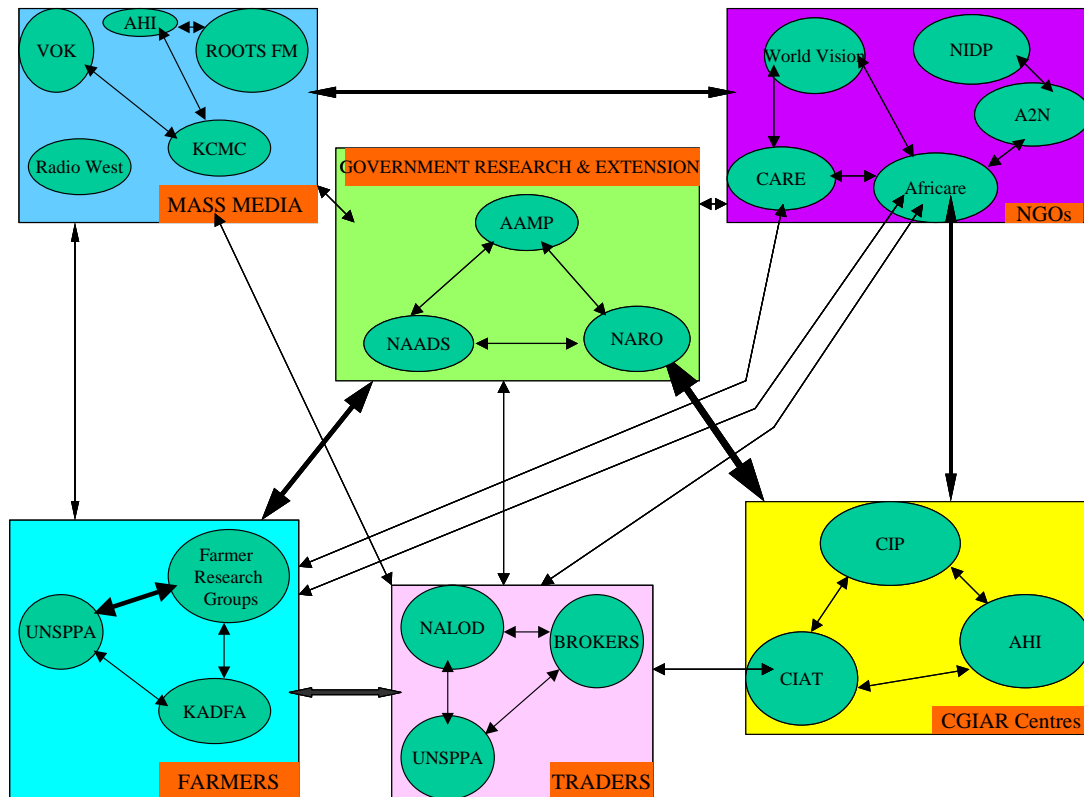
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**Figure 1: Schematic potato marketing chain Kenya**



**Figure 2: Constraints in interactions between potato producers, agro-chemical suppliers and extension workers.**



**Figure 3: Interaction<sup>†</sup> of AKIS-potato actors<sup>‡</sup> in Kabale, Uganda in 2004.**

<sup>†</sup>The thickness of the arrows indicates the strength of the linkages and information exchange.

<sup>‡</sup>AAMP = Area based Agricultural Modernization Programme NAADS = National Agricultural Advisory Services NARO = National Agricultural Research Organization A2N = Africa 2000 Network AHI = African Highlands Initiative CIAT = International Center for Tropical Agriculture CIP = International Potato Center NIDP = Nangara Integrated development Project UNSPPA = Uganda National Seed Potato Producers association NALOD = KADFA = Kabale District Farmers Association VOK = Voice of Kibwezi KCMC = Kachwekano Community Multi Media Centre NALOD = NAMLOD Perfect Consult Ltd.

**Table 1: Constraint ranking and suggested solutions for potato production and marketing in Kenya**

<b>Constraint</b>	<b>Rank Nyandarua</b>	<b>Rank Bomet</b>	<b>Suggested solutions</b>
Lack of high quality seed	2	1	<ul style="list-style-type: none"> <li>▪ Train seed multipliers</li> <li>▪ Teach positive selection</li> <li>▪ Farmer group seed multiplication</li> </ul>
Low prices for potatoes	8	2	<ul style="list-style-type: none"> <li>▪ Research into simple ware potato storage</li> <li>▪ Contract farming for the crisp industry</li> <li>▪ Better timing of production on the basis of price information supplied by the Min. Agriculture</li> <li>▪ Improve quality (see suggested solutions below)</li> </ul>
High prices / low use of fertilizers & chemicals	5	3	<ul style="list-style-type: none"> <li>▪ Credit scheme to be run by KPG&amp;MA</li> </ul>
Bacterial wilt	-	4	<ul style="list-style-type: none"> <li>▪ Train seed multipliers</li> <li>▪ Teach positive selection<sup>†</sup></li> </ul>
Minimal exchange of price information between farmers	4	5	<ul style="list-style-type: none"> <li>▪ Improve price communication between farmers by formation of common interest groups.</li> </ul>
Minimal contacts between market and knowledge chain actors	1	6	<ul style="list-style-type: none"> <li>▪ Use church gatherings and other meetings to introduce new technology</li> <li>▪ Demand driven technology that does not require capital investment</li> <li>▪ Initiate study groups with farmers and extension to improve interaction and provide a platform for technology testing</li> </ul>
Extended bags		7	<ul style="list-style-type: none"> <li>▪ By the time of the second workshop efforts for standardization were paying off</li> </ul>
Poor roads	3	8	<ul style="list-style-type: none"> <li>▪ Community road maintenance paid by levies collected by the local government</li> <li>▪ Setting up levy collection points by communities on feeder roads</li> </ul>
Lack of credit facilities	-	9	<ul style="list-style-type: none"> <li>▪ Credit scheme to be run by KPG&amp;MA</li> </ul>
Lack of storage facilities at farm level	-	10	<ul style="list-style-type: none"> <li>▪ Farmer managed research into simple on-farm storage.</li> </ul>
Low quality of potatoes offered to market	7	11	<ul style="list-style-type: none"> <li>▪ Harmonize size grading to standardize prices with assistance of KPG&amp;MA, Community Development Agency (CDA) and the local administration.</li> <li>▪ Improve quality of ware potato by using high quality seed and limited training.</li> <li>▪ Harvest crop when mature (hardened skin).</li> </ul>
Low yields	9	-	<ul style="list-style-type: none"> <li>▪ Improve seed quality, Credit scheme to be run by KPG&amp;MA to increase fertilizer and fungicide use.</li> </ul>

<sup>†</sup>The selection of healthy looking mother plants in ware potato farmers' fields as a source of seed for the next season.

**Table 2: Constraints and suggested solutions for potato production and marketing in Ethiopia**

<b>Constraint</b>	<b>Suggested solutions</b>
Limited interaction between research, extension, NGOs and farmers	<ul style="list-style-type: none"> <li>▪ Researchers should transfer information faster.</li> <li>▪ Existing stakeholder forum should be strengthened and new forums initiated</li> <li>▪ Improve training to transfer more information to farmers</li> <li>▪ Create a desk at the agricultural office for exchange between research and extension</li> <li>▪ Leaflets, manuals and other training materials should be made available to development agents and farmers</li> <li>▪ Development organizations need to cultivate a culture of collaboration</li> </ul>
Low prices for ware potatoes at farm gate	<ul style="list-style-type: none"> <li>▪ Strengthen farmer organizations</li> <li>▪ Joint marketing</li> <li>▪ Improve exchange of price information</li> <li>▪ Encourage farmers to construct improved ware potato stores</li> </ul>
Bad roads	<ul style="list-style-type: none"> <li>▪ District and zonal councils must repair them</li> </ul>
Unavailability of inputs	<ul style="list-style-type: none"> <li>▪ More input shops should be opened in rural areas</li> <li>▪ Farmer unions can play a role in the supply of agro-chemicals</li> <li>▪ Training on alternative low-input management strategies.</li> </ul>
Low quality products	<ul style="list-style-type: none"> <li>▪ Federal control of the quality of chemicals</li> </ul>
Limited adoption and further dissemination of technology by farmers	<ul style="list-style-type: none"> <li>▪ Improve training</li> <li>▪ Select early adopters to assist in facilitating innovation</li> <li>▪ Develop demonstration sites</li> <li>▪ Collaboration between researchers and extension staff in training farmers</li> <li>▪ Research should develop cost effective innovations</li> </ul>
Limited skills extension staff	<ul style="list-style-type: none"> <li>▪ Extension staff need to receive continuous training and their number should increase</li> </ul>
Low quality of potatoes	<ul style="list-style-type: none"> <li>▪ Farmers need training to become aware of how to improve quality, especially learning not to harvest immaturity.</li> <li>▪ Quality standards should be set for potatoes</li> </ul>
Weak credit schemes	<ul style="list-style-type: none"> <li>▪ Raise awareness about credit and pay-back mechanisms</li> <li>▪ Extending the lengths of loans</li> </ul>
Lack of quality seed potatoes	<ul style="list-style-type: none"> <li>▪ Reliable seed potato producers should be trained and listed</li> </ul>

**Table 3. Constraints and suggested solutions for potato production and marketing in Uganda.**

<b>Constraints</b>	<b>Solutions proposed</b>
Inappropriate packaging of training materials	<ul style="list-style-type: none"> <li>▪ Capacity building in creating training materials for research and extension staff</li> </ul>
Limited manpower research and NGOs, do not reach many farmers	<ul style="list-style-type: none"> <li>▪ Collaborate closer with NAADS service providers and public extension service</li> <li>▪ Use radio</li> <li>▪ Involve agro-input dealers</li> </ul>
Some incompetent contractors in NAADS	<ul style="list-style-type: none"> <li>▪ Collaborate closer with NGOs and research</li> </ul>
Reluctance of farmers to involve in learning new ideas, low group sustainability	<ul style="list-style-type: none"> <li>▪ More focus on sustainable farmer group formation</li> </ul>
Adulterated inputs sold	
Lack of credit facilities input dealers	
Limited funds radio stations	<ul style="list-style-type: none"> <li>▪ Collaborate closer with research, extension and NGOs.</li> </ul>